

REMARKS

In view of the above amendments and following remarks, reconsideration of the rejections contained in the Office Action of May 22, 2003 is respectfully requested.

REJECTIONS MADE BY THE EXAMINER

The Examiner again rejected claims 14-19 and 30-32 as being unpatentable over Matsuda et al., JP 63-313007 (Matsuda) in view of Itoh et al., U.S. 4,112,746 (Itoh). Further, the Examiner rejected claim 20 over these two references and in view of Matsuda et al. (Matsuda). Claims 21-24 and 29 were further rejected as being unpatentable over these two references and in further view of Savage et al., U.S. 5,315,881 (Savage). Also, claims 21, 23, 24 and 29 were rejected over these two references and in further of Karim-Panahi et al., U.S. 5,438,882 (Karim-Panahi).

These are the same references that have been previously applied by the Examiner. In making the primary combination of references, Matsuda and Itoh, the Examiner made a number of statements and conclusions with respect to what is known in the art, what is routine skill in the art, and what is commonly known and used in the art. However, this essentially amounts to a gap in what is properly taught by the prior art as evidenced by the prior art cited by the Examiner, and is a strong indication of a lack of motivation in the art to make the combination that is proposed by the Examiner.

In reviewing the rejections, as well as the Examiner's response to our previous arguments, the Examiner does not directly address the fact that the Matsuda and Itoh references are not analogous prior art. However, the Examiner does make the statement that "both inventions explore and define the axial elongation of specimens, and which observations are made in a similar manner. One of ordinary skill in the art would have expected in such case that the manipulation of data from both references could exist without departing from the structural scope of the invention." However, this does not directly address the question of whether these references are properly analogous art, and certainly does not address the two step test required to determine such.

In the above amendments, claim 14 has been further amended to help distinguish over the prior art. However, it will become clear that such amendment is in fact not necessary as both

independent claims 14 and 19 already clearly distinguish over the art. The issues raised above, and further distinctions over the art, will be explained in detail below.

THE ITOH REFERENCE IS NON-ANALOGOUS ART, AND
MAY NOT BE CONSIDERED BY THE EXAMINER

In order for a reference to be properly combinable with another reference in an obviousness-type rejection, the reference must be analogous prior art, i.e. analogous to the invention. A two part test has been established for determining whether a reference is analogous prior art. The Examiner's attention is directed to MPEP §2141.01(a), which sets forth this test. Thus, in order to rely on a reference as a basis for rejection, the reference must either (1) be in the field of Applicant's endeavor, or if not, then (2) be reasonably pertinent to the particular problem with which the inventor was concerned. See the citations in this section of the MPEP.

Applying the first test, the field of the present invention is an axial elongation measuring method for a rotary shaft, and a device therefor. The field of Itoh is a tensile testing system, more specifically an opto-electronic testing system. Clearly this is not the same field, and the second step of the test must be looked at.

Applying the second step, the problems with which the present invention are concerned are the prior art use of a gap sensor, requiring measurement over a large gap. Further, the present invention was also concerned with reducing the amount of space required for such measurement. By its terms, Itoh is concerned with improving a tensile testing system, avoiding troublesome preparation of specimens, permitting ready mounting and demounting of specimens, and being capable of simultaneously and individually testing a plurality of specimens. Thus, the concerns of Itoh are clearly divorced from those of the present invention.

From the above, it can be readily seen that Itoh does not even rise to the level of analogous prior art with respect to the present invention. As such, the Examiner is not permitted under the law to consider it together with the Matsuda reference. For this reason alone, the Examiner's rejection must be withdrawn.

IT IS NOT OBVIOUS TO MODIFY MATSUDA WITH ITOH

The present invention provides a method and device for measuring the axial elongation of a rotary shaft. Two marks 10 and 12 are provided on a rotational surface of the rotary shaft 1. The marks are inclined with respect to each other. A sensor 14 is provided opposite to the surface of the shaft and operable to generate pulses when the marks have passed the sensor during rotation of the shaft. The axial elongation of the rotary shaft is measured from changes in an interval ratio of the pulses that are generated by the sensor when the marks pass the sensor during rotation of the rotary shaft. This is illustrated by referring to Figs. 2.

Time t_1 represents the time from the detection of one mark to the next mark, i.e. from the point of time from the detection of the reference mark to the measuring mark. The time t_2 represents one rotation of the shaft. As discussed in the specification in the paragraphs spanning pages 9 and 10, due to axial elongation of the shaft, pulses generated by the sensor 14 change from an interval ratio of t_1/t_2 in Fig. 2(a) to a ratio of t_{12}/t_{22} in Fig. 2(b). By measuring the change in the pulse interval ratio t_1/t_2 obtained by the sensor 14, the axial elongation of the rotary shaft 1 can be measured.

The advantage of employing the interval ratio of the pulses is that the axial elongation of the shaft is determined irrespective of the rotational speed of the shaft.

In the rejection the Examiner acknowledged that Matsuda does not disclose measuring or determining the axial elongation of the rotary shaft from a change in an interval ratio of the pulses generated by the sensor. However, the Examiner went on to take the position that Itoh teaches a tensile testing system employing a ratio computing circuit. The Examiner refers to column 32, lines 40-43.

As the Examiner has acknowledged, the deficiency of Matsuda is that it does not employ a change in an interval ratio of the pulses generated by the sensor in measuring the axial elongation of the rotary shaft in claim 14, or have a data processing part operable to determine the axial elongation from the change in the interval ratio as required by claim 18. Itoh has lightness lines 44 and a specimen 40 which are scanned by a scanning device. This is all part of a tensile testing system that is used to test a region of a specimen of rubber or other material defined along the mid portion of the

specimen. But Itoh contains no teaching whatsoever that would suggest to one of ordinary skill in the art to modify Matsuda.

To properly be combined with and modify Matsuda, (assuming for purposes of argument that Itoh is analogous art), the art must recognize some advantage or motivation to be gained from making the modification. For example, there might be a problem identified with respect to the arrangement of Matsuda that is resolved by Itoh.

However, there is no deficiency whatsoever identified with respect to Matsuda. Apparently, from either the terms of Matsuda or Itoh, Matsuda will work perfectly acceptably for its purpose. It is only the present inventors that have identified problems with measuring axial elongation over a wide range while maintaining accuracy, as well as minimizing the amount of space necessary. None of these problems are identified by Matsuda or Itoh.

The Examiner cites the case of *In re Japikse*, 86 USPQ 70, standing form the proposition that "rearranging parts of an invention involves only routine skill in the art." However, this case is inapplicable to the present situation. The Examiner appears to cite the case for the proposition that duplicating the slanted markings would have made the device more accurate. However, this is inconsistent with the case itself, which simply stands for the proposition that rearranging parts of an invention, where the arrangement does not have any functional effect or make any difference, is obvious. This is not the case with the invention of claims 14 and 19, however.

Both claims 14 and 19 require the provision of two marks and a rotation surface of a rotary shaft such that the marks are oppositely inclined to one another relative to the axial direction of the shaft so that the circumferential direction interval between the marks changes according to the axial direction and position along the rotary shaft. Such is not present in either Matsuda or Itoh. Such is not taught by either Matsuda or Itoh. Such is not obvious from either Matsuda or Itoh, because Matsuda and Itoh do not have any suggestion or reason for this kind of arrangement. This type of arrangement does provide a distinct advantage with the present invention. Thus, it is not a mere rearrangement of parts, nor is it obvious in view of a specific teaching from the references themselves.

The Examiner further proposed the modification in Matsuda to use the determination of length by means of determining variations in the ratio of pulses to obtain length or distance measurements.

However, because Itoh is so distinctly different than present invention, one of ordinary skill in the art would not have recognized the need for any such combination. This is particularly the case where there is no problem or deficiency recognized in the art with respect to Matsuda; it is only the present inventors who have recognized this deficiency. Nor is there any other reason suggested for this use that would be applicable to the situation of Matsuda. The Examiner attempts to resolve this problem with respect to the teachings of the references by stating that this "only involves a mathematical manipulation of data that are well known in the art." Whether or not the two different methods can be characterized as differences in the way that data are manipulated is irrelevant to obviousness. Two different ways of manipulating data can be unobvious from each other depending upon the situation. Obviousness is determined dependent upon the teachings of the references themselves. In this case, there is no apparent reason from either Matsuda or Itoh to apply the teachings of Itoh to Matsuda. Thus one of ordinary skill in the art simply has no motivation to make any such combination.

The Examiner's rejection is clearly unsupported by the evidence of record and the law. References cannot be combined in the manner proposed by the Examiner. There is no suggestion from either Itoh or Matsuda to make the modifications of Matsuda that are proposed by the Examiner. The Examiner's statements of what is commonly known in the art and reference to *In re Japikse* do not substitute for a proper teaching of motivation to make a combination that is based upon reason as opposed to conjecture. The Examiner's combination, rather, appears to be a classic example of hindsight reasoning. The references themselves do not provide any reason to make a combination thereof.

**THE ABOVE AMENDMENT FURTHER DISTINGUISHES
OVER THE PRIOR ART OF RECORD**

To emphasize the differences between the present invention and the cited prior art, claim 14 has been amended to recite that the two marks on the rotational surface of the rotary shaft form a V shape that is turned relative to the axial direction of the shaft in the same axial position so that the circumferential direction interval between the marks changes according to the axial direction position along the rotary shaft. Such feature is clearly not present from Itoh, as it does not relate to a rotary

shaft, but simply separate marks along the rubber specimen. Matsuda provides a single mark 2 and reference mark 3. It thus requires two sensors 4 and 5, whereas the present invention can employ one sensor for both marks due their positioning. Thus none of the references cited by the Examiner disclose this feature.

The secondary reference to Savage, Karim-Panahi and Hochstein each also fails to disclose this feature.

Thus, claim 14 even further distinguishes over all of the prior art cited by the Examiner.

CONCLUSION

From the above, it is respectfully submitted to be clear that all of the claims pending in the present application patentably distinguish over each of the references cited by the Examiner. The Matsuda and Itoh patents are not analogous art. Further, even if they could be combined, there is no proper motivation or suggestion to make any proper combination of these two references.

The Examiner's reliance upon *In re Japikse* is misplaced under the present circumstances. Whether a certain mathematical manipulation of data are commonly utilized and whether the ratios between two quantities are commonly known and used is not relevant to the propriety of the combination of references in the absence of a proper motivation, i.e. a reason to use such common knowledge in the particular circumstance. Nor, indeed, has the Examiner established that such are common knowledge.

Accordingly, no further issues should remain in the present application, and indication of the allowability of all of the claims is respectfully requested.

In view of the above amendments and remarks, it is submitted that the present application is now in condition for allowance, and the Examiner is requested to pass the case to issue. If the Examiner should have any comments or suggestions to help speed the prosecution of this application, the Examiner is requested to contact Applicants' undersigned representative.

Respectfully submitted,

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